

New Aircraft Procurement

Problem:

The year is 1990. The U.S. carrier force structure and tactics are currently based on 30-year-old technology. Both the F-14 Tomcat and the A-6 Intruder are aging, outdated aircraft that are having increasing difficulties competing with new generation aircraft and weapon systems. The more recent F-18 Hornet has shown itself to be effective in several areas, but its limitations have demonstrated that it is an inadequate replacement for either aircraft.

Proposal:

It is proposed that a new aircraft for use aboard aircraft carriers be purchased. Subsequent evaluations may be used to justify adoption as a land-based asset for the Air Force as well.

Task:

Provide analysis of the enclosed data to permit the Secretary of Defense to recommend the best of four aircraft proposed by defense contractors.

Guidance:

There are certain specifications required of the chosen aircraft. Some of these are political, some are tactical.

The aircraft chosen must be able to be configured both as an air-to-air fighter and as a ground attack platform. An individual aircraft will be configured only for one mission type (either AA or Attack, but not both) for each sortie, based on the mission. As an air-to-air fighter, it should be adequate in both dog fighting and intercept roles. As a ground attack platform, it should be able to attack hardened targets and provide ground support. Each aircraft has 7 weapons stations: 1 on each wingtip, 2 under each wing, and 1 centerline. The centerline station can also be used to carry a 1000 lb auxiliary fuel tank (included in fuel capacity figures). Weaponry shown in the aircraft specifications indicate which weapons systems are possible to use in configuring an aircraft prior to launch, and the maximum number of each weapon the airframe can carry (max payload not considered) on a mission. Probabilities of kill at various ranges were acquired in live fire tests. Weights and costs are also provided. The weapons listed are already in our inventory. Some are in the process of being phased out, but should still be used in the study.

The aircraft chosen must have a minimum combat radius of 600 NM, including 10 minutes worth of mission (flight) time, and must land with a minimum fuel reserve of 10%. If flying with the auxiliary fuel tank, the pilot will jettison the tank upon exhaustion or in a fight (attack) posture. Aircraft can refuel upon takeoff before proceeding on a mission.

The current requirement is for 8 aircraft carriers in service at any time. Each carrier will have between one and three squadrons of the new aircraft on it. Squadrons consist of between 8 and 14 aircraft. As the carriers are currently manned, they can take only 34 new aircraft. However, if more are desired then other aircraft can be removed. The airframe removal strategy is listed in the data

Aircraft must go for a major maintenance/inspection every 1000 flight hours. This is about every 400 missions (assuming 2.5 hours per mission) or approximately between 8 and 9 years of fleet service. The expected lifetime of the aircraft can be taken as the same as the aircraft it replaces. Over the lifetime of an aircraft, only about 5% of all missions are combat missions.

According to Don Chappell (USNA '74) of Vaught Aircraft Co., acquisition costs are about 58% of life cycle costs.

Specifications:

1. Both fighter/interceptor and ground attack capable
2. Minimum combat radius of 600 NM, including 10 min fight time and 10% fuel reserve
3. Visual ID capable at 75 NM
4. P(kill) of at least .8 at 50 NM (fighter role)
5. P(kill) of at least .8 at nominal attack ranges
6. 8 carrier Navy
7. At least 1 and not more than 3 squadrons on a carrier
8. Between 8 and 14 aircraft in a squadron
9. For each aircraft over 34 on a carrier, one of the following must be removed: S-3, SH-60, F-18, E-2, RF-##, HH-60

Costs		YFA-25	YF-28	YF-19C	YFI-22B
Cost per a/c	(\$millions)	\$45	\$41	\$38	\$47
Fixed cost for program	(\$millions)	\$127	\$95	\$103	\$114
Capabilities					
Speed	(knots)	1500	1800	1500	1600
Fuel capacity	(1000 lbs)	18	15	18	16
In flight burn rate	(1000 lbs/hr)	4.5	5.1	4.5	4.8
Takeoff burn	(lbs)	2000	1800	2000	1900
Combat burn rate	(1000 lbs/hr)	10	10	10	9
Max payload	(lbs)	4500	5000	4000	5500
Roll rate	(deg/sec)	540	720	720	720
Max G	(g's)	9.5	10.2	9.5	9.2
Max -G	(g's)	3.2	3.3	3	2.8
Weaponry					
AIM-7		4	4	6	6
AIM-9		2	2	2	2
AIM-54		4	4	4	0
AIM-120		2	0	2	0
AGM-45		4	4	4	4
AGM-62		0	4	4	0
AGM-88		0	0	0	4
AGM-122		0	0	0	6
AGM-123		4	0	0	4
BLU-9x		4	0	4	0
Guns		yes	yes	yes	yes
Visual ID system		VID 22A	VID 14	VID 22A	ADV VID 27C

Weapon Weight	Pk at max	Pk at mid	Pk at min	Cost per
Capabilities	range	range	range	weapon
(lbs)				(\$thousands)
AIM-7 350	0.6	0.85	0.9	\$31
AIM-9 185	0.5	0.7	0.8	\$27
AIM-54 985	0.7	0.9	0.99	\$72
AIM-120 300	0.8	0.9	0.99	\$86
AGM-45 390	0.4	0.5	0.6	\$20
AGM-62 2450	0.45	0.65	0.7	\$19
AGM-88 780	0.7	0.8	0.95	\$92
AGM-122 200	0.6	0.75	0.85	\$100
AGM-123 1283	0.8	0.9	0.99	\$95
BLU-9x 500	0.5	0.7	0.85	\$15
Guns in a/c	0.2	0.5	0.8	\$0

Pk's arrived at using 50 test fires at appropriate ranges. Assume a variance of 0.0342